

Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the above-identified application:

Listing of Claims

Claim 1 (Currently Amended): A system for issuing an authentication certificate used in personal authentication, comprising:

a DNA extractor for obtaining a gene from a given person;

reaction means for reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a the gene obtained from a given person by said DNA extractor;

storage means for registering the hybridization pattern obtained by said reaction means in association with type information specifying a probe layout of the DNA array used for obtaining said hybridization pattern;

issuing means for issuing an authentication certificate for certifying the person; and

controlling means for executing a process comprising the steps of:

(i) making said reaction means react the DNA array with a gene obtained from the given person to form a hybridization pattern; and

(ii) making said issuing means issue an authentication certificate by attaching the reacted DNA array obtained in the step (i) to a base of the authentication certificate;

wherein an authentication is realized by comparing hybridization pattern subjected to the authentication and type information of a DNA array with the registered hybridization pattern of a given person and corresponding type information.

Claims 2-6. (Canceled)

Claim 7 (Original): The system according to claim 1, wherein DNA probes of the DNA array comprise gene probes associated with major histocompatibility complex antigens.

Claim 8 (Original): The system according to claim 1, wherein DNA probes of the DNA array comprise gene probes associated with major histocompatibility complex antigens and single nucleotide polymorphisms.

Claim 9 (Original): The system according to claim 1, further comprising extraction means for extracting DNA from a blood sample, and providing the DNA to said reaction means.

Claim 10 (Original): The system according to claim 1, wherein a substrate on which the base and the DNA array are integrally formed is used.

Claim 11 (Currently Amended): A method for issuing an authentication certificate used in personal authentication, comprising the steps of:

(i) reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person to form a hybridization pattern; ~~and~~

(ii) registering the hybridization pattern in association with type information specifying a probe layout of the DNA array used for forming said hybridization pattern;

(iii) issuing an authentication certificate for certifying the person by attaching the reacted DNA array obtained in the step (i) to a base of the authentication certificate;

wherein an authentication is realized by comparing hybridization pattern subjected to the authentication and type information of a DNA array with the registered hybridization pattern of a given person and corresponding type information.

Claims 12-16 (Canceled).

Claim 17 (Original): The method according to claim 11, wherein DNA probes of the DNA array comprise gene probes associated with major histocompatibility complex antigens.

Claim 18 (Original): The method according to claim 11, wherein DNA probes of the DNA array comprise gene probes associated with major histocompatibility complex antigens and single nucleotide polymorphisms.

Claim 19 (Original): The method according to claim 11, further comprising the extraction step of extracting DNA from a blood sample, and providing the DNA to the reaction step.

Claim 20 (Original): The method according to claim 11, wherein a substrate on which the base and the DNA array are integrally formed is used.

Claim 21 (Currently Amended): An apparatus for issuing an authentication certificate used in personal authentication, comprising:

reaction means for reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person to form a hybridization pattern; and

storage means for registering the hybridization pattern formed by said reaction means in association with type information specifying a probe layout of the DNA array used for forming said hybridization pattern; and

issuing means for issuing an authentication certificate for certifying the person by attaching the reacted DNA array obtained by said reaction means to a base of the authentication certificate,

wherein an authentication is realized by comparing hybridization pattern subjected to the authentication and type information of a DNA array with the registered hybridization pattern of a given person and corresponding type information.

Claims 22-23 (Canceled)

Claim 24 (Original): The apparatus according to claim 21, further comprising extraction means for extracting DNA from a blood sample, and providing the DNA to said reaction means.

Claim 25 (Currently Amended): An authentication system for personal authentication which is used together with an authentication certificate on which a DNA array reacted with a gene obtained from a given person is attached, the DNA array carrying a plurality of DNA probes corresponding to plural kinds of genes in a predetermined order, the system comprising:

storage means for storing registration information which includes layout information representing a hybridized pattern of reacted DNA array and type information specifying a probe layout of said reacted DNA array;

acquisition means for reading the hybridization pattern of a reacted DNA array attached on a authentication certificate and acquiring layout information from the hybridization pattern; and

controlling means for executing a process comprising the steps of:

(i) generating authentication information on the basis of the layout information acquired by said acquisition means and type information specifying a probe layout of DNA array used in said acquisition means; and

(ii) collating the authentication information with the registration information as a reference stored in said storage means, and making authentication.

Claim 26 (Original): The system according to claim 25, wherein the registration information and authentication information contain the layout information and type information used to specify a probe layout on the DNA array.

Claim 27 (Original): The system according to claim 25, wherein the layout information includes data that represent positions of the hybridized probes on the DNA array by coordinate values.

Claim 28 (Previously presented): The system according to claim 25, wherein said acquisition means comprises a scanner for reading the hybridized pattern of the reacted DNA array as an image, and conversion means for detecting probes after reaction from the read image, and converting the detected probes into the layout information.

Claims 29-30 (Canceled).

Claim 31 (Original): The system according to claim 25, further comprising registration means for storing the authentication information generated by said generation means in said storage means as the registration information.

Claim 32 (Original): The system according to claim 25, wherein the DNA array comprises gene probes associated with major histocompatibility complex antigens.

Claim 33 (Original): The system according to claim 25, wherein the DNA array comprises gene probes associated with major histocompatibility complex antigens and single nucleotide polymorphisms.

Claim 34 (Original): The system according to claim 25, wherein the DNA array is formed by arranging a plurality of probes in row and column directions, and

the layout information expresses the positions of the hybridized probes on the DNA array using row and column addresses.

Claim 35 (Original): The system according to claim 25, wherein the authentication information and registration information contain person specifying information for specifying a given person, and

said authentication means makes authentication by searching said storage means for registration information which contains the same person specifying information as the person specifying information contained in the authentication information generated by said generation means, and collating the layout information of the generated authentication information and the registration information found by search.

Claim 36 (Original): The system according to claim 25, wherein an apparatus having said acquisition means and said generation means, and an apparatus having said

storage means and said authentication means are connected via the Internet, and the authentication information is sent via the Internet.

Claim 37 (Currently Amended): An apparatus for sending an authentication request to an external apparatus, the apparatus being used with an authentication certificate on which a reacted DNA array obtained by reacting a DNA array with a gene obtained from a given person is attached, in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, the apparatus comprising:

acquisition means for reading the hybridization pattern of a reacted DNA array attached on a authentication certificate and acquiring layout information from the hybridized pattern; and

controlling means for executing a process comprising the steps of:

(i) generating authentication information on the basis of the layout information acquired by said acquisition means and type information specifying probe layout of the DNA array attached on the authentication certificate;

(ii) sending the authentication information generated in the step (1) to the external apparatus, and requesting user registration; and

(iii) sending the authentication information to the external apparatus, and requesting authentication.

Claim 38 (Canceled).

Claim 39 (Currently Amended): An authentication method for personal authentication comprising the steps of:

(i) providing a storage means which stores registration information including layout information representing a hybridization pattern formed on a reacted DNA array obtained by reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person and type information specifying probe layout of said reacted DNA array in association with the layout information;

(ii) acquiring layout information from an authentication certificate by reading a hybridization pattern of a reacted DNA array attached on the authentication certificate;

(iii) generating authentication information on the basis of the layout information acquired in the step (ii) and type information specifying probe layout of the DNA array attached on the authentication certificate; and

(iv) collating the authentication information generated in the step (iii) with the registration information stored in said storage means, and making authentication.

Claim 40 (Original): The method according to claim 39, wherein the registration information and authentication information contain the layout information and type information used to specify a probe layout on the DNA array.

Claim 41 (Original): The method according to claim 39, wherein the layout information includes data that represent positions of the hybridized probes on the DNA array by coordinate values.

Claim 42 (Previously presented): The method according to claim 39, wherein

the acquisition step comprises the conversion step of detecting probes after reaction from an image read by a scanner for reading the reaction pattern of the reacted DNA array as an image, and converting the detected probes into the layout information.

Claims 43-44 (Canceled)

Claim 45 (Original): The method according to claim 39, further comprising the registration step of storing the authentication information generated in the generation step in said storage means as the registration information.

Claim 46 (Original): The method according to claim 39, wherein the DNA array comprises gene probes associated with major histocompatibility complex antigens.

Claim 47 (Original): The method according to claim 39, wherein the DNA array comprises gene probes associated with major histocompatibility complex antigens and single nucleotide polymorphisms.

Claim 48 (Original): The method according to claim 39, wherein the DNA array is formed by arranging a plurality of probes in row and column directions, and

the layout information expresses the positions of the hybridized probes on the DNA array using row and column addresses.

Claim 49 (Original): The method according to claim 39, wherein the authentication information and registration information contain person specifying information for specifying given person, and

the authentication step includes the step of making authentication by searching said storage means for registration information which contains the same person specifying information as the person specifying information contained in the authentication information

generated in the generation step, and collating the layout information of the generated authentication information and the registration information found by search.

Claim 50 (Original): The method according to claim 39, wherein an apparatus having the acquisition step and the generation step, and an apparatus having said storage means and the authentication step are connected via the Internet, and the authentication is sent via the Internet.

Claim 51 (Currently Amended): A method for sending an authentication request to an external apparatus, comprising:

the acquisition step of acquiring layout information that represents a hybridization pattern formed on a reacted DNA array obtained by reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person, by reading a reacted DNA array attached on an authentication certificate;

the generation step of generating authentication information on the basis of the layout information acquired in the acquisition step and type information specifying probe layout of the DNA array attached on the authentication certificate;

the registration request step of sending the authentication information to the external apparatus to request user registration; and

the authentication request step of sending the authentication information to the external apparatus to request authentication.

Claim 52 (Canceled)

Claim 53 (Currently amended): An authentication certificate used to authenticate a given person, comprising:

a base; and

a reacted DNA array attached on said base,

wherein said ~~reacted DNA array is obtained by reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from said person, and a hybridization pattern formed on said reacted DNA can be retrieved by an image scanner.~~ authentication certificate is issued by an apparatus comprising:

a reaction unit adapted to, in order to generate said reacted DNA array, react a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person to form a hybridization pattern;

a registering unit adapted to register the hybridization pattern formed by said reaction unit in association with type information specifying a probe layout of the DNA array used for forming said hybridization pattern; and

an issuing unit adapted to issue an authentication certificate for certifying the person by attaching the reacted DNA array obtained by said reaction unit to a base of the authentication certificate,

wherein an authentication is realized by comparing hybridization pattern subjected to the authentication and type information of a DNA array with the registered hybridization pattern of a given person and corresponding type information.

Claims 54-56 (Canceled).

Claim 57 (Currently Amended): A computer readable medium which stores a control program for making a computer execute an authentication process for personal authentication using storage means for storing registration information which includes layout information that represents a hybridization pattern formed on a reacted DNA array obtained by reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person, and type information specifying probe layout of said reacted DNA array in association with the layout information, said control program comprising:

a code of the acquisition step of acquiring the layout information from a reacted DNA array attached on an authentication certificate;

a code of the generation step of generating authentication information on the basis of the layout information acquired in the acquisition step and type information specifying probe layout of the DNA array attached on the authentication certificate; and

a code of the authentication step of making authentication by collating the authentication information generated in the generation step with the registration information stored in said storage means.

Claim 58 (Currently Amended): A computer readable ~~program~~ medium which stores a control program for making a computer execute an authentication process for making authentication using an authentication certificate attached with a hybridization pattern formed on a reacted DNA array obtained by reacting a DNA array in which a plurality of DNA

probes corresponding to plural kinds of genes are arranged in predetermined order, with a gene obtained from a given person, said control program comprising:

a code of the acquisition step of acquiring layout information that represents the layout pattern of the hybridized probes by reading a reacted DNA array attached on the authentication certificate;

a code of the generation step of generating authentication information on the basis of the layout information acquired in the acquisition step and type information specifying probe layout of the DNA array attached on the authentication certificate;

a code of the registration request step of sending the authentication information to the external apparatus to request user registration; and

a code of the authentication request step of sending the authentication information to the external apparatus to request authentication.

Claim 59 (Canceled)

Claim 60 (Currently Amended): A system for issuing an authentication certificate used in personal authentication, comprising:

reaction means for reacting a DNA array with a gene obtained from a given person to form a hybridization pattern, the DNA array being selected from plural kinds of DNA arrays each of which has a plurality of DNA probes corresponding to plural kinds of genes arranged in a predetermined order, wherein the order of the DNA probes in the plural kinds of DNA arrays are different from each other;

registering means for registering the hybridization pattern formed by said reaction means and type information specifying an order of DNA probes of the selected DNA array; and

issuing means for issuing an authentication certificate for certifying the person by attaching a reacted DNA array obtained by said reaction means on the authentication certificate.

Claim 61 (Currently amended): An authentication method comprising the steps of:

(i) reacting a DNA array with a gene obtained from a given person to form a first hybridization pattern, the DNA array being selected from plural kinds of DNA arrays each of which has a plurality of DNA probes corresponding to plural kinds of genes arranged in a predetermined order, wherein the order of the DNA probes in the plural kinds of DNA arrays are different from each other;

(ii) registering type information regarding the order of the DNA probes of the DNA array selected in the step (i) in association with the first hybridization pattern;

(iii) issuing an authentication certificate carrying a hybridization pattern formed on a reacted DNA array obtained by the step (i) to the given person;

(iv) forming a second hybridization pattern, when a person holding the authentication certificate issued in the step (iii), needs to be identified as a true holder of the authentication certificate, the step (iv) comprising the sub-steps of:

(iv-1) regenerating a new DNA array which is identical to the DNA array selected in the step (i) by using the type information registered in the step (ii); and

(iv-2) reacting the new DNA array with a gene obtained from the suspected person to form a second hybridization pattern; and

(v) comparing the first hybridization pattern on the authentication certificate and the second hybridization pattern.